

ABSTRACT OF THE DISCLOSURE

Systems and methods that control the size and composition of emulsified droplets, multi-lamellar and asymmetric vesicles, encapsulation of reagents, membrane proteins, and sorting of vesicles/droplets. More particularly, microfluidic devices for controlled viscous shearing of oil-water emulsions of micro- and nano-scale droplets, the subsequent formation of amphiphilic vesicles such as liposomes, polymer vesicles, micelles, and the like, the post-assembly and post-processing of the droplets including splitting, fusing, sorting and the like, polymer emulsions, and the integration of amphiphilic vesicle production-line on a single microfluidic chip. Preferably, the microfluidic device enables oil-water co-flows with tunable viscous shear forces higher than the immiscible interfacial tension forces that generate favorable conditions for droplet formation.